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RESEARCH PAPER

Industrial Value Added and Urbanisation Dynamics in South Asia: Panel Data Evidence Using the Driscoll–Kraay Estimator

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ABSTRACT

This study examines the macroeconomic determinants of urbanisation in Pakistan, Bangladesh, India, and Sri Lanka from 1980 to 2024. Rapid urbanisation in South Asia is linked with industrialisation and economic transformation. Identifying its key drivers is important for sustainable urban development. The study uses a quantitative panel data approach based on annual secondary data from four South Asian countries. Urbanisation is the dependent variable, while industrial value added, GDP growth, trade openness, population density, population growth, and inflation are explanatory variables. The Fixed Effects Model with Driscoll–Kraay standard errors was applied after detecting heteroscedasticity, autocorrelation, and cross sectional dependence. Trade openness and inflation positively and significantly affect urbanisation, whereas population density has a negative effect. Industrial value added and GDP growth also influence urbanisation trends. Policymakers should encourage balanced industrial growth and effective urban planning to manage rapid urban expansion.

Keywords: Urbanisation, Industrial Value Added, Trade Openness, South Asia, Panel Data

Introduction

In recent years, speedy urbanisation has been recognised as one of the defining features of growth policies. The positive connection between urbanisation and economic growth can be outlined in several well-known lines of economic research. Several strands of economic literature explain the relationship between urbanisation and economic growth. These include the concept of cities as engines of economic growth, the spatial economy and new economic geography theories that emphasise the benefits of agglomeration and accumulation (Venables, 1996), and studies highlighting the higher productivity of large cities (Combes, 2012). The huge rise in the urban population is often linked to the growing prosperity of urban segments, driven by output improvements and higher per capita gross domestic product (GDP). But studies have established that urban population growth in South Asian countries has been mostly driven by natural population growth and the reclassification of rural settlements, rather than by large-scale rural-urban migration.

The direction of the relationship between urbanisation and growth remains unclear. In some cases, growth drives urban expansion, while in others urbanisation supports income gains. Historical patterns differ. In the United States, both urbanisation and income rose together before mid-20th century, after which income grew faster. In contrast, countries like China and India experienced declining rural populations alongside strong income growth, which points to a close but varying link between urbanisation and economic performance.

Urbanisation patterns vary across South Asia. Pakistan is one of the fastest-urbanising countries in the region, with over one-third of its population residing in urban areas, and major cities contributing a substantial share of GDP and tax revenue, while structural economic challenges — including persistent trade imbalances and inflationary pressures — continue to shape urban migration patterns (Riaz et al., 2025; Saeed & Shabeer, 2025). India's urban sector contributes nearly two-thirds of national output, and its urban population continues to expand rapidly.

In contrast, Sri Lanka remains one of the least urbanised countries in the region, with less than one-fifth of its population living in urban areas. Bangladesh has experienced steady urban growth over the decades, driven by migration, demographic expansion, and structural economic changes.

These differing trajectories highlight the need to examine the macroeconomic factors shaping urbanisation within the South Asian context.

Literature Review

Many previous studies have found that urbanisation levels are strongly associated with per capita GDP (Henderson, 2003). Firebaugh (1979) investigated structural determinants of urbanisation in Asia and Latin America by using 27 Asian and Latin American nations from 1960 to 1970. The study used an ordinary least squares model to estimate the outcome. In his study, urbanisation is the dependent variable, and economic development and rural conditions are the control variables. The study pointed out that economic development and rural conditions have been positively associated with urbanisation in developing nations of Asia and Latin America.

Chang and Brada (2006) explored the paradox of China's growing under-urbanisation using data from 1975 to 2002. A simple linear regression model is used to analyse the empirical results. The study used urbanisation as the dependent variable and GDP per capita at purchasing power parity as the independent variable. The findings of this study indicated that, in China, an urbanisation lag began to emerge in the modern era due to rapid economic growth.

Kolomak (2012) explored urbanisation and Economic Development in Russia using data from 2000 to 2008. They used least squares models to analyse the empirical results. The study used GDP per capita as the dependent variable, and Stock of capital, Share of urban population, the Square of share of urban population, and average size of cities are used as explanatory variables. The study found that a 1% increase in Russia's urban population will increase regional productivity by 8%.

Bai *et al.* (2012) examined landscape urbanisation and in China from 1990 to 2006. They found negative impact of urbanization on GDP.

Chen *et al.* (2014) elaborated the global pattern of urbanisation and economic growth using cross-sectional data from 1980-2011. Multiple regression models have been used in empirical analyses. In this study, urbanisation speed is the dependent variable, and GDP per capita is the independent variable. The finding showed no significant relation between urbanisation and economic growth.

Nasir and Naz (2015) used real per capita income as the dependent variable and urbanisation, Government expenditure, inflation, and Capital stock as explanatory variables. Co-integration analyses are used to find the empirical results. The findings showed that urbanisation is positively associated with economic growth and has a long-term relationship, and that it positively affects economic growth across the services, industrial, and manufacturing sectors. But urbanisation has adverse effects on economic progress in the agricultural sector.

Rani and Tripathi (2016) examined the determinants of urbanisation across different size/class distributions of cities/towns in India using data from the Census of India 2011. In this study, urbanisation is the dependent variable, while environmental effect, infrastructure facilities, and spatial interaction are independent variables. Ordinary least squares models have been applied to analyse the results. The results showed that environmental effects and infrastructure facilities have a positive impact on urbanisation. Spatial interaction is negatively related to urbanisation in India.

Deb (2017) investigated City Systems in South Asian urbanisation and Growth using panel data from 1970 to 2015. The study found that urbanisation, small cities, and medium cities are positively associated with economic growth. However, a large, primary city has a negative impact on economic growth.

Song *et al.* (2018) explained used China's data from 2005 to 2010. They used sensitivity analysis methods to estimate the empirical results. The results of the study indicated that urbanisation has become one of the engines of China's economic growth.

Nguyen and Nguyen (2018) concluded urbanisation and economic growth have a positive and non-linear relationship in case of seven selected Asian countries by using the Granger causality test, FE, RE, Driscoll and Kraay, D-GMM, and the PMG test for empirical analyses. The thresholds for the static and dynamic models are 69.99% and 67.94%, respectively.

Arshad *et al.* (2020) investigated the effects of deforestation and urbanisation on sustainable growth in Asian countries by using panel data from 1990 to 2014. The study used economic growth as the dependent variable and deforestation (CO2) and urbanisation as independent variables. The Pedroni co-integration test and the Unit root test were used to investigate the results in this study. The study found that urbanisation has a positive effect on economic growth. However, urbanisation and economic growth have been negatively associated with deforestation.

Ermias (2020) assessed the determinants of urbanisation in Ethiopia using Ordinary Least Squares regression and a multi-method approach. They suggested that manufacturing and economic growth play a very minor role in Ethiopian urbanisation.

Wang *et al.*, (2024) conducted an empirical cross-country analysis of the determinants of economic growth using data from 1990 to 2018. Multiple regression analysis. The study found that increases in trade, the urban population growth rate, and the inflation rate are positively associated with economic growth. However, the unemployment rate has been negatively associated with economic growth. Several scholars have contributed to this area of research, including Ayyubi et al. (2024), Anwar et al. (2024), Iqbal et al. (2025), Monawar et al. (2025), Saeed and Shabeer (2025), and Zubair et al. (2023), as well as studies examining the socioeconomic costs of consumption patterns on urbanising populations (Riaz et al., 2025), and further evidence on household savings behaviour and demographic drivers in urbanising South Asian economies has also been documented (Taymoor et al., 2025)

Material and Methods

Data Sources

The present study uses data from 1980 to 2024 and considers four countries in the South Asia region: Bangladesh, India, Pakistan, and Sri Lanka. Nepal, Bhutan, and Afghanistan are excluded from the analysis due to data unavailability. Data on the variables used in the study are from the World Development Indicators (WDI) and the Penn World Table (PWT). Urbanisation is measured by the urban population as a percentage of the total population. The determinants of urbanisation include the real industrial value added constant 2010, population density, population growth, GDP annual growth rate, and inflation for the sample countries; the selection of these macroeconomic variables is consistent with prior empirical work on structural economic drivers in South Asian economies (Saeed & Shabeer, 2025; Taymoor et al., 2025).

Model Specification

The literature indicates that the South Asia region is experiencing rapid, unambiguous urbanisation. Although urbanisation is an important determinant of economic growth. But it is equally essential to have an optimal organisation for sustainable living standards. The present study has investigated the major factors which influence the undesirable urbanisation in the South Asian region. Several functional forms have been tested to probe the major determinants of urbanisation in the South Asia region; however, the most appropriate is presented below.

$$LUP = f(LIV, LTO, PGR, LPD, EGR, CPI) \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$LUP_{it} = \eta_i + \eta_1 LIV_{it} + \eta_1 LTO_{it} + \eta_2 LPG_{it} + \eta_3 LPD_{it} + \eta_4 LGR_{it} + \eta_5 LCP_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where,

LIV = Industrial value added constant 2010
LUP = Urban population (% of total population)
LPD = Population density (people per sq. km of land area)
LTO = Trade (% of GDP)
PGR = Population growth (annual %)
EGR = GDP growth (annual %)
CPI = Inflation, consumer prices (annual %)

Description of the Variables

Details of the Variables are given in Table 1. All the data is sourced from the World Development Indicators (WDI).

Table 1
Variable Descriptions

Variable	Abbreviation	Description	Proxy / Measurement
Urbanisation	LUP	Degree of urban development in the economy	Urban population (% of total population)
Industrial Value Added	LIV	Contribution of the industrial sector to economic output	Real industrial value added (constant 2010 prices)
Trade Openness	LTO	Level of integration of an economy with international markets	Total trade (exports + imports) as a percentage of GDP
Population Density	LPD	Concentration of population relative to land area	People per square kilometre of land area
Population Growth	PGR	Annual increase in total population	Population growth rate (annual %)
Economic Growth	EGR	Expansion of economic activity in the economy	GDP growth rate (annual %)
Inflation	CPI	Rate of increase in the general price level	Consumer Price Index (CPI), annual % change

Estimation Methods

This study employs panel data techniques to examine the determinants of urbanisation in selected South Asian countries. Panel data integrates cross-sectional (countries) and time-series (years) information, which improves estimation efficiency and helps control for unobserved country-specific characteristics (Hsiao, 2007), an approach also widely adopted in South Asian economic research examining labour market outcomes, food security, and occupational risk (Anwar et al., 2024). To examine the relationship between urbanisation and its macroeconomic drivers, this study considers two standard panel models: Fixed Effects (FE) and Random Effects (RE). The FE model accounts for time-invariant country-specific factors, while the RE model treats these effects as part of the error term.

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Diagnostic Tests and Robustness

To ensure the reliability of the empirical results, several diagnostic tests are conducted. The Wooldridge test is used to examine the presence of serial correlation in the panel data, while the Modified Wald test checks for group-wise heteroscedasticity. In addition, the Breusch–Pagan LM test is employed to detect cross-sectional correlation among the sample countries. The results of these tests indicate the presence of heteroscedasticity, serial correlation, and cross-sectional dependence in the model.

Driscoll–Kraay Robust Standard Errors

Given the presence of heteroscedasticity, serial correlation, and cross-sectional dependence, the study applies Driscoll–Kraay (1998) robust standard errors within the fixed effects framework. This estimator produces consistent and reliable standard errors even when these econometric issues exist in panel data. Therefore, in this study, the fixed effects model with Driscoll–Kraay standard errors is used to obtain robust empirical results.

The Driscoll-Kraay covariance matrix with FEM is computed as follows. Assume the following linear model (White, 1980).

$$Y_{it} = X_{it}\theta + \varepsilon_{it}$$

Where

$$\theta = (X'X)^{-1}X'X$$

All model variables within the transformed

$$Z'_{it} \in \{Y_{it}, X_{it}\}$$

$$\widetilde{Z_{it}} = Z_{it} - \bar{Z}_i + \bar{\bar{Z}}$$

Where

$$\bar{Z} = T_i^{-1} \sum_{t=ti1}^{Ti} Z_{it}$$

and

$$\bar{\bar{Z}} = \left(\sum Ti\right)^{-1} \sum_i \sum_t Z_{it}$$

But within estimator is equal to the least square estimator, so it is estimated by the method of least squares with Driscoll-Kraay standard error.

Lag Length Selection Criteria

The optimal lag length is selected using the Newey–West (1987) plug-in procedure. It determines the appropriate lag based on the sample size. This approach helps account for possible autocorrelation in the panel data and ensures reliable Driscoll–Kraay robust standard errors for statistical inference.

The Newey and West plug-in estimator is given below:

$$m(T) = floor\left[4\left(\frac{T}{4}\right)^{\frac{2}{9}}\right]$$

Where

$m(T)$ is the maximum lag length and T is the time period.

The rule of thumb to choose the maximum lag length is as follows:

$$m(T) = T^{\frac{1}{4}}$$

Where

$m(T)$ is the maximum lag length, and T is the time period.

Result and Discussion

Section 3 briefly discussed the data sources and econometric modelling used in this research. Section 4 presents the data analysis, descriptive statistics, correlation matrix and the estimated econometric regression results.

Descriptive Statistics

The first step is to analyse the data to assess its accuracy. To check whether the data is accurate or not? The econometrician uses a set of tools called descriptive statistics, which is shown in Table 2, and it contains mean, standard deviation, maximum, and minimum.

Table 2
Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
LUP	164	1.403	.113	1.172	1.582
LIV	164	10.459	.644	9.5	11.906
LTO	164	1.549	.21	1.087	1.948
LPD	164	2.53	.34	.699	3.093
PGR	164	.204	.22	-.887	.527
EGR	161	.68	.21	-.279	1.009
CPI	164	.841	.231	.171	1.417

Table 2 reports the descriptive statistics of the variables. The mean value of the urban population is 1.403, with a standard deviation of 0.113, ranging from 1.17 to 1.58. The average values of industry value addition, trade openness, population density, population growth, economic growth and inflation are 10.46, 1.55, 2.53, 0.20, 0.68, and 0.84, respectively. Their standard deviations range between 0.21 and 0.64, indicating moderate variation across observations. Overall, the minimum and maximum values show reasonable dispersion, suggesting the data is suitable for further empirical analysis. Certain observations are missing due to limited data availability for some variables and years across the selected South Asian countries, which reduced the total number of observations used in the empirical analysis.

Correlation Matrix

Figure 1 exhibits the correlations between the dependent variable, LUP, and the independent variables, LIV, LTO, LPD, PGR, EGR, and CPI, which are 0.584, -0.212, -0.213, 0.056, & -0.010, respectively. This correlation has confirmed the nature of the association between the dependent and independent variables. Also, the correlation among the independent variables is very low, confirming the absence of multicollinearity.

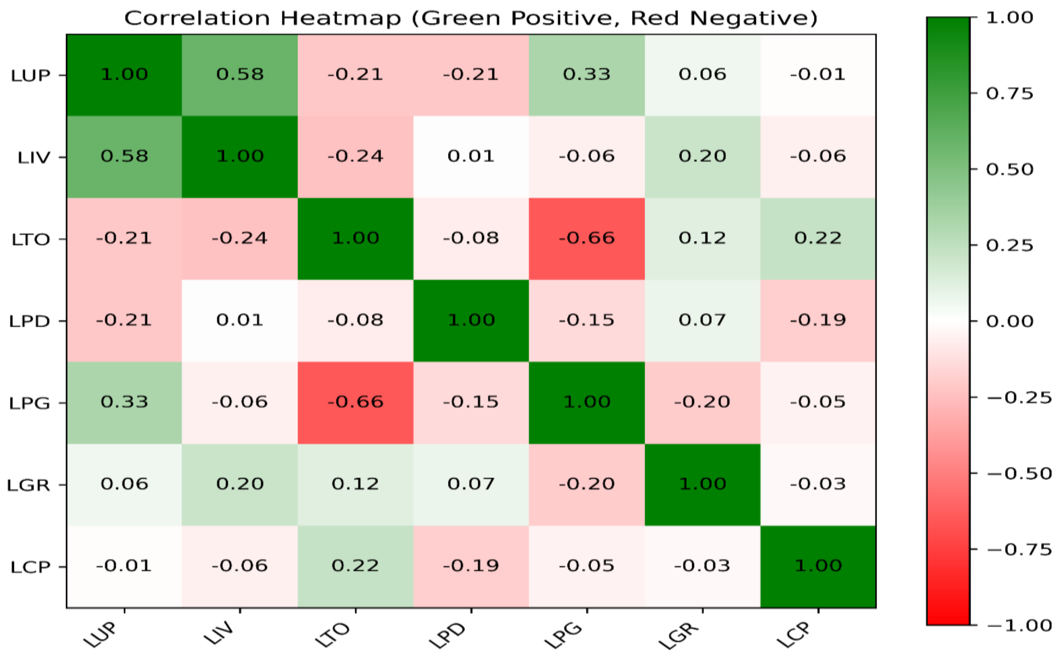

Figure 1 Correlation Matrix of Study Variables

Regression Results

Section 3 exhibits the results of panel data models, namely, pooled OLS, FEM, REM, and Drisc-Kraay Robust Standard Error and their interpretation. (Driscoll & Kraay, 1998).

Table 3
Pooled Linear Regression

LUP	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
LIV	0.118	0.014	8.43	0.000	0.090	0.143	***
LTO	0.141	0.051	2.76	0.000	0.042	0.256	***
LPD	-0.028	0.021	-2.06	0.041	-0.076	-0.002	**
PGR	0.214	0.057	7.03	0.000	0.207	0.370	***
EGR	-0.009	0.034	-0.08	0.939	-0.063	0.058	
CPI	-0.011	0.031	-0.53	0.597	-0.069	0.040	
Constant	-0.080	0.201	-0.47	0.637	-0.413	0.253	
Mean dependent var		1.404		SD dependent var		0.113	
R-squared		0.491		Number of obs		161.000	
F-test		30.605		Prob > F		0.000	
Akaike crit. (AIC)		-359.429		Bayesian crit. (BIC)		-337.859	

*** p<0.01, ** p<0.05, * p<0.1

Table 3 shows a pooled OLS regression model. The dependent variable is LUP, and the independent variables are LIV, LTO, LPD, PGR, EGR, and CPI. LIV, LTO, and PGR are positively associated with urbanisation. Whereas LPD, EGR, and CPI negatively affected urbanisation in the South Asian region. It is a baseline regression. The R-squared and F-test are used to assess goodness-of-fit. The R-square value is 0.54, indicating that 54% of the variation is explained by the explanatory variables. F-test = 30.605; Prob > F (0.0000) indicates the model is a good fit.

Table 4
FEM Regression results

LUP	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
LIV	0.166	0.015	11.21	0.000	0.137	0.195	***
LTO	0.115	0.022	5.14	0.000	0.071	0.159	***
LPD	-0.032	0.009	-3.34	0.001	-0.050	-0.013	***
PGR	0.029	0.030	0.94	0.348	-0.031	0.089	
EGR	0.021	0.013	1.64	0.103	-0.004	0.047	
CPI	0.044	0.012	3.75	0.000	0.021	0.067	***
Constant	-0.487	0.157	-3.10	0.002	-0.797	-0.177	***

*** p<0.01, ** p<0.05, * p<0.1

Model statistics

Mean of dependent variable = 1.404, SD = 0.113

R^2 = 0.786, F(6, 154) = 92.47, p < .001

AIC = -653.392, BIC = -631.822

Prob > F 0.000

Table 4 displays the results of the Fixed Effect model. Similar to the previous model, the LUP is the dependent variable. Whereas industrial value added, trade openness, population density, population growth, and GDP growth are the independent variables. Industrial value added, trade openness and inflation have a positive and statistically significant impact on urbanisation. On the other hand, population density has a negative and significant effect on urbanisation in our sample countries. The R-squared value has improved compared to the baseline regression. R-square=0.78. This implies that 78% of the variation in the dependent variable is due to the independent variables. Similarly, the F-test value of 92.474 and Prob > F = 0.000 confirm the model's stability.

Table 5
REM Regression results

LUP	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
LIV	0.122	0.011	11.46	0.000	0.101	0.143	***
LTO	0.169	0.044	3.85	0.000	0.083	0.256	***
LPD	-0.039	0.019	-2.06	0.040	-0.076	-0.002	**
PGR	0.289	0.041	7.03	0.000	0.208	0.369	***
EGR	-0.002	0.031	-0.08	0.939	-0.062	0.058	
CPI	-0.015	0.028	-0.53	0.597	-0.069	0.040	
Constant	-0.080	0.169	-0.47	0.636	-0.410	0.251	
Mean dependent var	1.404		SD dependent var			0.113	
Overall R-squared	0.544		Number of obs			161.000	
Chi-square	183.627		Prob > chi2			0.000	
R-squared within	0.289		R-squared between			0.681	

*** p<0.01, ** p<0.05, * p<0.1

Table 5 reveals the results of the Random Effect model. Like the prior models, the LUP is the dependent variable. Whereas LIV, LTO, LPD, PGR, EGR, CPI. LIV, LTO independent variables LIV, LTO, and PGR are positively associated with LUP. Conversely, EGR and CPI have a negative and significant effect on urbanisation. The value of R-square=0.54.

Robustness Checking

To ensure reliable estimation, the study applies standard diagnostic tests. These include the Wooldridge test for autocorrelation, the Modified Wald test for heteroscedasticity, and residual correlations to check cross-sectional dependence. Model selection relies on the Hausman test and the fixed effects test.

Table 6
Diagnostic Test Results

Test Type	Null Hypotheses	Test Statistics		P-Values
		F-test	Chai-Square	
Hausman (1978) specification test	Both Consistent		150.644	1.000
Wooldridge test for autocorrelation in panel data	no first-order autocorrelation	239.605	-	0.0006
Breusch–Pagan LM test:	No Cross-Sectional Dependence	-	71.138,	0.0000
Modified Wald test for groupwise heteroskedasticity in fixed effects	No Heteroskedasticity		232.52	0.0000
Fixed Effect Test	Pooled OLS	92.474		0.0000

Table 6 exhibits the results of different diagnostic tests. The result of the Wooldridge test for serial correlation in panel data, F-test = 239.605, Prob-F = 0.000, clearly rejected the null hypothesis of "No Correlation". Similarly, the p-value of the Modified Wald test for groupwise heteroscedasticity in the fixed-effect regression model, and the correlation matrix of residuals, are both less than 0.05. The highly significant p-values indicated heteroscedasticity and cross-sectional dependence in our model. The Fixed effect test = 92.474, p-values = 0.0000, rejected the null hypothesis of "Pooled OLS". The FEM is a more appropriate model (Ashley, 2012; Baltagi, 2008; Greene, 2003). In the presence of serial correlation, heteroscedasticity, and cross-sectional dependence, the regression results are inconsistent and biased (Arellano, 2003; Drukker, 2003; Newey & West, 1987; White, 1980). To avoid the problems of autocorrelation, heteroscedasticity, and spontaneous correlation (Driscoll & Kraay, 1998). It produces efficient and robust results.

Drisc-Kraay Robust Standard Error

Driscoll and Kraay (1998) proposed the robust standard error to produce efficient results in the case of violations of the least square assumptions related to the disturbance term. Because our model violated all three basic assumptions of least squares. The FE model with

Table 7
FEM Regression results with Drisc / Kraay Robust Standard Error

LUP	Coef.	Std. Err. Drisc-Kraay	T	P>t	[95%Conf.	Interval]
LIV	0.166	0.018	9.330	0.000	0.130	0.202
LTO	0.115	0.012	9.530	0.000	0.091	0.139
LPD	-0.032	0.006	-4.890	0.000	-0.045	-0.019
PGR	0.029	0.038	0.750	0.458	-0.048	0.106
EGR	0.021	0.017	1.260	0.214	-0.013	0.055
CPI	0.044	0.019	2.270	0.028	0.005	0.083
_cons	-0.487	0.204	-2.390	0.022	-0.899	-0.075
Number of groups	4					
Number of obs	161					
within R-squared	0.7861					
F(6, 40)	181.51			0.0000		
Number of obs	161					

Table 7 shows the results of the fixed-effects model using Driscoll and Kraay's (1998) robust standard errors to address problems associated with the disturbance term. As in previous estimations, the dependent variable is urbanisation, and the explanatory variables are industrial value added, trade openness, population density, population growth, GDP growth rate, and inflation. These results are robust. The signs of the parameters seem correct and consistent with theory & prior expectations. The LIV, LTO, and

CPI are statistically significant and positively associated with the proxy of urbanisation. While the population density is highly significant and negatively correlated with urbanisation.

The relation between LIV is positive and significant; a 1% increase in LIV brings about a 0.17% increment in LUP. The proxy for trade openness is trade as a percentage of GDP; LTO has a positive, statistically significant impact on LUP, and a 1% increase in trade openness stimulates urbanisation by 0.12%, a finding consistent with broader evidence on how trade dynamics shape economic structures and living conditions in Pakistan (Shabeer et al., 2024; Ali et al., 2024). In the same way, the CPI enhances urbanisation by 0.044% in the South Asia region. On the other hand, log GDP growth & log population growth have a positive effect on log urbanisation but are statistically insignificant; both variables increase urbanisation by 0.021% & 0.044%, respectively. Conversely, population density was statistically significant and negatively associated with urbanisation. 1% surge in LPD reduces the LUP by -0.032.

R-squared and the F-test are considered essential criteria for model goodness-of-fit. The value of R-square is 0.79, indicating that 79% variation in the dependent variable is due to the explanatory variables. The F-test also confirmed that the model is most appropriate.

Conclusion

The fundamental aim of the present study is to investigate the deep determinants of urbanisation in selected South Asian countries (India, Bangladesh, Pakistan, and Sri Lanka). The panel data for the period 1980-2024 has been utilised. The dependent variable is urbanisation. Urbanisation is measured by the percentage of the urban population in the total population. The explanatory variables include industrial value added, trade openness, population density, population growth, GDP growth, & consumer price index, a proxy for the inflation rate. To test the study's hypothesis, we estimate a panel data model. Pooled OLS, fixed effect, and random effect have been utilised. To select the appropriate model, various model selection diagnostics have been utilised; for instance, the “Fixed Effect” test was applied to choose between Pooled OLS and Fixed Effect Models. Similarly, the Hausman (1978) specification was estimated for the section between “Fixed Effect” and “Random Effect” models.

This study applies standard diagnostic tests to ensure reliable inference. These include the Wooldridge test for autocorrelation, the Modified Wald test for heteroscedasticity, and residual correlations for cross-sectional dependence. Model selection is based on the Hausman and fixed effects tests. The results reject the null hypotheses of no serial correlation, no heteroscedasticity, and no cross-sectional dependence, confirming the presence of these issues in the data.

Driscoll and Kraay (1998) robust standard error with the fixed effect model to counter the problems of serial correlation, heteroscedasticity, and cross-sectional dependence. The dependent variable is urbanisation, and the explanatory variables are industrial value added, trade openness, population density, population growth, GDP growth rate, and inflation. These results are robust. The signs of the parameters seem correct and consistent with theory & prior expectations. Industrial value added, trade openness, and population growth positively associated with the proxy of urbanisation, while population density is highly significant and negatively correlated with urbanisation — findings that align with the broader literature linking economic structural change and urbanisation in developing economies (Ayub Islam et al., 2024; Shabeer et al., 2024).

One limitation of this study is the small cross sectional dimension of the panel, as the analysis includes only four South Asian countries. Although the Driscoll–Kraay estimator is robust to heteroscedasticity, autocorrelation, and cross sectional dependence, its performance is generally stronger in panels with a larger number of cross sectional units. Therefore, the results should be interpreted with caution.

Another limitation of this study is the possible two way relationship between urbanisation and economic growth. Economic growth can increase urbanisation through industrial development and better employment opportunities, while urbanisation can also contribute to economic growth by improving productivity and economic activity. This creates the possibility of reverse causality and endogeneity in the model. Although the fixed effects model with Driscoll–Kraay standard errors helps produce robust results, it may not completely remove these issues. Future research may use advanced techniques such as GMM or instrumental variable methods to address this limitation more effectively.

Policy Recommendations

This study aims to investigate the deep determinants of urbanisation in the South Asian region. Over time, urbanisation rapidly accelerated in South Asian economies. Although urbanisation is positively associated with economic development, beyond a certain point, it may hamper living standards. This study was intended to probe essential determinants of urbanisation.

Industrial value added stimulates urbanisation, and policymakers of these nations should develop new industrial estates in less developed areas, since evidence from Pakistan's food systems and industrial sectors suggests that regionally targeted economic policy is essential for reducing spatial inequalities (Shabeer et al., 2024; Anwar et al., 2024). Population density hampers the urbanisation process, and an increased number of people per square km lowers living standards. Providing new opportunities in less developed areas may reduce the number of people per square km

Rapid population growth has also led to undesired urbanisation. The governments of sample countries should formulate policies that support population control. Trade openness has also accelerated urbanisation, and the policymakers of these countries should adopt policies that promote trade liberalisation, thereby boosting urbanisation and living standards, while remaining mindful of the environmental and social costs associated with rapid structural transformation. GDP growth positively affects urbanisation. The government should formulate policies that increase investment opportunities in newly developed cities. The rate of inflation also intensifies urbanisation. This type of surge may be undesirable because it can reduce people's purchasing power. They should control inflation to enhance the purchasing power of their masses.

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